

SYSTEM OF EQUATIONS - GAUSSIAN ELIMINATION.

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$$\begin{cases} x + 5y + 4z + 3w = 0 \\ 2x - y + 2z - w = 0 \\ 5x + 3y + 8z + w = 1 \end{cases}$$

$$A = \begin{bmatrix} 1 & 5 & 4 & 3 \\ 2 & -1 & 2 & -1 \\ 5 & 3 & 8 & 1 \end{bmatrix}$$

$$B = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$$

$$X = \begin{bmatrix} x \\ y \\ z \\ w \end{bmatrix}$$

I have to transform matrix $[A|B]$ into $[I : \begin{smallmatrix} x \\ y \\ z \\ w \end{smallmatrix}]$
using some operations on matrices.

$$\left[\begin{array}{cccc|c} 1 & 5 & 4 & 3 & 0 \\ 2 & -1 & 2 & -1 & 0 \\ 5 & 3 & 8 & 1 & 1 \end{array} \right] \xrightarrow{\substack{r_2 = r_2 - 2r_1 \\ r_3 = r_3 - 5r_1}} \left[\begin{array}{cccc|c} 1 & 5 & 4 & 3 & 0 \\ 0 & -11 & -6 & -7 & 0 \\ 0 & 22 & -12 & -14 & 1 \end{array} \right]$$

I want to have zeros here.

I want to have zero here.

$$r_3 = r_3 - 2r_2$$

$$\left[\begin{array}{cccc|c} 1 & 5 & 4 & 3 & 0 \\ 0 & -11 & -6 & -7 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{array} \right]$$

$$0x + 0y + 0z + 0w = 1$$

$$0 = 1$$

it's a contradiction!
there are no solutions.